

TERRESTRIAL VERTEBRATES IN THE ENVIRONS OF UTAH LAKE

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ABSTRACT.— From an historical aspect, there are or have been 215 species and 62 families of terrestrial vertebrates found in the environs of Utah Lake. The classes Amphibia and Reptilia are represented by 4 species in 3 families and 12 species in 4 families, respectively. The class Aves has the highest numbers of species and families. The birds are represented by 152 species and 39 families. There are 47 species of mammals found within 16 families. Three additional species of reptiles have been reported to one of us by the Division of Wildlife Resources personnel as occurring in the environs of Utah Lake, but these are not recorded in the literature and have not been verified by us.

The terrestrial vertebrates (amphibians, reptiles, birds, and mammals) comprise an integral part of the fauna on and around Utah Lake. Birds are the most numerous, are more frequently observed, and create a greater impact on the lake than amphibians, reptiles, and mammals. However, each group represents an important component of the vertebrate fauna associated with this body of water. The information on these vertebrates is arranged in the usual phylogenetic order, with biological data on the various species and, wherever it is available, information concerning the historical aspects.

The tetrapod fauna of the environs of Utah Lake include four species of amphibians representing 3 families, 12 species of reptiles in 4 families, 152 species of birds representing 39 families, and 47 species of mammals found within 16 families. The total tetrapod fauna found in and around the lake consists of 215 species within 62 families.

AMPHIBIANS AND REPTILES

In the environs of Utah Lake, there are three distinct communities that provide habitat for amphibians and reptiles, viz., grassy meadows at or near the shoreline, rivers and other permanent streams, and the dry shoreline along the west side. Each community contains certain species that are distinct from those in the other communities.

Grassy Meadows Near or at the Shoreline

Four species of amphibians and two of reptiles occur in this habitat. Some of them are wide ranging species that occur in other areas. They are, however, common in the shoreline meadows.

Bufo woodhousei woodhousei Girard. Woodhouse's Toad. This is perhaps the least common annuran in the meadows. It occurs there primarily during the breeding season, but it is in the surrounding fields and gardens during the summer. This is a ravenous insect feeder and may be found under street lights on warm evenings feeding on the insects attracted to the light.

Pseudacris nigrita triseriata Wied. Western Chorus Frog. This species is common throughout the meadows of Utah and ranges from the low valleys such as Utah Valley to the high mountain valleys up to 10,000 feet. In Utah Valley, it is abundant in the meadows around the lake. In April and May breeding choruses occur in standing water in fields, meadows, ditches, etc. Eggs are laid in clusters and are usually entangled in the submerged vegetation.

Rana pipiens brachycephala Cope. Western Leopard Frog. This is perhaps the most widespread and abundant amphibian in Utah. Large numbers of them occur in the meadows and fields surrounding Utah Lake. Slow-moving streams and meadow ponds serve as

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the breeding areas. After breeding the adults disperse widely in the meadows and adjoining fields in search of food. Only moist ground or seepages are required to provide their water requirements. In this regard, the leopard frog is only slightly more dependent on moisture than our *Bufo*.

Because of its adaptive versatility, this frog may be found in all moist habitat niches from the shoreline into the meadows, along drainage ditches, permanent streams from springs and rivers, and into the adjoining irrigated fields.

***Rana pretiosa pretiosa* Baird and Girard.** Western Spotted Frog. This frog is more selective of its habitat, occurring primarily in the near vicinity of emerging spring water. It is not generally found in open meadows unless there is a large spring providing the water flow. It has been found in the springs and for a short distance down from them all along the Provo River and its adjacent meadows and springs. Breeding populations have been found from the North Fork of Provo River to springs near Utah Lake. This is a more secretive species, more apt to be sitting in the water than on the bank. Therefore, they need only to submerge to disappear. The characteristic splash of the leopard frog as it leaves the bank for the water is rarely heard in the spotted frog. Because of its preference for cool springs, this frog is not widespread in the meadows surrounding Utah Lake. They are not rare, but occur in reasonable numbers in their habitat niche.

***Thamnophis elegans vagrans* Baird and Girard.** Wandering Garter Snake. This snake is widely distributed throughout the meadows and along streams. It is not restricted to water or moist habitats, but is apparently found in these areas because of the abundance of food. For example, in the meadows are frogs and field mice for the adults and, for the young, numerous insects and other invertebrates, as well as fish along streams and the lake shoreline. Since this snake is a generalized feeder, the mesic habitat offers not only a great variety of food but an abundance.

***Thamnophis sirtalis parietalis* Say.** Red-sided Garter Snake. This snake is restricted primarily to the meadows surrounding the lake. They are rarely found in cultivated

fields or dry meadows. From the Provo Boat Harbor north to the old Geneva Resort area they occur in the meadows and in shoreline vegetation along the lake. In this habitat, they are more abundant than the wandering garter snake, although both occur in the same habitat.

It lives in a more aquatic habitat than the wandering garter snake and is thought to feed more frequently on amphibians and fish. Because of its fish-eating habits, individuals are occasionally found along Provo River well above the area of the shoreline meadows.

River and Permanent Stream Habitats

Rivers and some streams enter the lake and provide willow and bank habitats quite different in their basic nature to that found in the open shoreline meadows and adjacent fields. These differences provide opportunity for a few other species to approach the vicinity of Utah Lake.

***Coluber constrictor mormon* Baird and Girard.** Western Racer. In the willow thickets along the rivers this snake may be found, often nearly to the shoreline. The willow habitat attracts small birds and other species of small rodents not found in the meadows. Thus, a new habitat niche is established as a finger extending through the meadows to the lake. In this area, a different food chain is established, with the racer preying on small birds and those species of rodents (such as *Peromyscus*) that enter this habitat.

***Pituophis catenifer deserticola* Stejneger.** Great Basin Gopher Snake. Whether this snake extends its range west along Provo River to Utah Lake is not known, but it is a distinct possibility. It has been seen along the Provo River, west of Provo.

Shoreline on West Side of Utah Lake

Little water enters the lake from the west; thus the meadows on the western shore are narrow and merge into the rocky foothills often awash with lake water.

Few reptiles seen near the shoreline on the east side of the lake are also present on the west side. Several species of lizard (*Uta*, *Sceloporus*, *Cnemidophorus*, *Phrynosoma*) have been seen near the water, and several snakes (particularly *Pituophis*, *Masticophis*,



Fig. 1. Great Blue Heron. Photo by R. J. Erwin.

and *Coluber*) are found above the shoreline in the grasses and low-growing shrubs near the lake.

In the meadows southwest of the Saratoga Resort, there was at one time a large population of *Pituophis*, *Masticophis*, *Coluber*, *Hypsiglena*, and *Crotalus* that fed largely on mice and/or lizards during the summer and hibernated in a ledge a short distance to the southwest. We have seen *Pituophis* moving from the den to the meadow, and Pack (1920?) reports an experience at the time some of these meadows were being harvested for hay. Gopher snakes were present and feeding on numerous mice.

We must recognize that the west side of Utah Lake has a very different shoreline compared to that of the east. Because of its

greater slope, it provides less meadow and thus fewer (but the same species) amphibians but a greater variety of reptiles (both lizards and snakes) that utilize the shoreline habitat.

There are few streams or springs entering the lake from the west side. This fact and the steeper slope reduce the meadows along the shoreline and permit the desert shrub habitat to descend from the foothills to or near the water's edge. Thus, reptiles not normally seen near water may occur within a few feet of it. Because the lake has a fluctuating level, the condition described above usually occurs during the spring or early summer, when the water level is at its maximum.

Two students working for the Division of Wildlife Resources reported that they collected two species of amphibians in the envi-

rons of Utah Lake that were not reported in this paper. They collected the bullfrog, *Rana catesbeiana*, at Lincoln Beach, Powell Slough, and the Provo Airport and the western toad, *Bufo boreas*, at Genola Warm-springs. These species have not been verified by us, but there is no reason to believe they should not occur in these areas. The bullfrog is an introduced species in Utah; the other species is native.

MAMMALS

Each species of living organism has adapted through time to a particular type of habitat. Each species of mammal found in or near Utah Lake is there because its requirements for food, shelter, courtship, and the rearing of young are available.

Human activities often provide new types of habitats that allow additional species to inhabit a region. Frequently these are undesirable animals that may cause damage to property or to man himself. Chief among these are old world rats and mice that are pests of houses, farms, and garbage dumps. In some cases the rats may be vectors of disease.

Not infrequently human activities or environmental change may modify the habitat to the extent that some animals cannot continue to exist; for example, the beaver and mink, once abundant in Utah Lake (Chavez and Warner 1976), are now limited in number (Wm. Davis, pers. comm.). To the best of our knowledge, in April 1976 there were only two active beaver lodges in the environs of Utah Lake. Both of them were in the willow trees on the east shore of Provo Bay. The drought during the winter of 1976-77 may have driven these animals out, because since then there has been no beaver activity around either lodge. The last verified observation of a wild mink near the lake was made by Dr. Stephen D. Durrant (pers. comm.) on the Orem Boat Harbor in the early 1960s. There are occasional reports of mink observations near the lake, but they usually turn out to be animals that have escaped captivity.

There are 44 known native wild mammalian species living around Utah Lake (Table 1). They include: one insectivore, 8 bats, 3

rabbits, 23 rodents, 8 carnivores, and the mule deer. Due to their secretive nature or nocturnal habits, we do not often see many of these animals. Table 1 provides an estimate of the relative abundance of each species and the type of habitat in which they are usually found.

In addition to those native wild mammals listed in Table 1, there are three introduced species, viz., house mouse (*Mus musculus*), norway rat (*Rattus norvegicus*), and raccoon (*Procyon lotor*). The first two live in close association with man in houses, out-buildings, and open garbage pits. Both are destructive to property and stored food products. The raccoon seldom occurs far from water, which seems to have limited its natural dispersal throughout our semiarid state even though it is found in the Raft River and Uinta Mountains and southwestern Washington County. It has been reported that several pair were released near the northeast shore of Utah Lake several years ago. Since their release there have been many reports of raccoon observations on the east side of the lake.

Historically, bison were found around Utah Lake. Dominguez and Velez de Escalante (Chavez and Warner 1976:60) recorded in their journal that bison were "... not too far away ..." from the lake. Coues and Yarrow (1875), on a geographic survey through Utah Valley 100 years after Dominguez and Velez de Escalante, made the following comment concerning the bison and Utah Lake [p. 68]:

Formerly quite common in Utah as it is still remembered by the older Indians. We were informed by Mr. Peter Madsen, an intelligent fisherman, of Utah Lake, that in drawing his nets in that body of water he has frequently hauled up the skulls of *Buffaloes* [sic] and it is supposed that they were driven across the plains by the Indians upon the ice in the winter season, they broke through and were drowned.

Economically the muskrat has been the most important fur-bearing mammal in Utah Valley. Most muskrats have been collected in the region surrounding Utah Lake, but accurate records are not available for the number collected. However, some idea of the economic impact of these has been obtained from local trappers and fur buyers. These people indicate that the loss of habitat has almost destroyed the fur business in Utah Valley. The trappers indicated that 15 years ago

TABLE 1. Native mammals of Utah Lake, their relative abundance, and the type of habitat they usually prefer. Relative abundance: A = abundant; C = common; U = uncommon; Ca = casual; R = rare; E = extinct.

Name	Relative abundance	Marshlands sloughs	Grass pastures	Riparian—trees and willows	Dry brushland west of Utah Lake
Vagrant Shrew <i>Sorex vagrans</i>	C	X	X	X	
Big Myotis <i>Myotis lucifugus</i>	C				
Hairy-winged Myotis <i>Myotis volans</i>	U				
Silvery-haired Bat <i>Lasionycteris noctivagans</i>	C				
Big Brown Bat <i>Eptesicus fuscus</i>	C				
Hoary Bat <i>Lasiurus cinereus</i>	C				
Long-eared Bat <i>Plecotus townsendii</i>	U				
Spotted Bat <i>Euderma maculatum</i>	R				
Brazilian Free-tailed Bat <i>Tadarida brasiliensis</i>	C				X
Black-tailed Jackrabbit <i>Lepus californicus</i>	C			X	X
Nuttall Cottontail <i>Sylvilagus nuttallii</i>	C				X
Pigmy Rabbit <i>Sylvilagus idahoensis</i>	Ca				X
Yellow-bellied Marmot <i>Marmota flaviventer</i>	U				X
Townsend Ground Squirrel <i>Spermophilus townsendii</i>	A		X		X
Uinta Ground Squirrel <i>Spermophilus armatus</i>	C		X		X
Rock Squirrel <i>Spermophilus variegatus</i>	C			X	X
Antelope Ground Squirrel <i>Ammonspermophilus leucurus</i>	C			X	X
Least Chipmunk <i>Eutamias minimus</i>	C		X		
Botta Pocket Gopher <i>Thomomys bottae</i>	C				X
Great Basin Pocket Mouse <i>Perognathus parvus</i>	U				X
Ord Kangaroo Rat <i>Dipodomys ordii</i>	C				X
Chisel-toothed Kangaroo Rat <i>Dipodomys microps</i>	U				X
Harvest Mouse <i>Reithrodontomys megalotis</i>	C		X		X
Deer Mouse <i>Peromyscus maniculatus</i>	A	X	X	X	X
Pinyon Mouse <i>Peromyscus truei</i>	U				X
Northern Grasshopper Mouse <i>Onychomys leucogaster</i>	U			X	X
Desert Wood Rat <i>Neotoma lepida</i>	C				X
Bushy-tailed Wood Rat <i>Neotoma cinerea</i>	C				X
Sagebrush Vole <i>Lagurus curtatus</i>	Ca				

Table 1 continued.

Name	Relative abundance	Marshlands sloughs	Grass pastures	Riparian—trees and willows	Dry brushland west of Utah Lake
Muskrat <i>Ondatra zibethicus</i>	C	X		X	
Pennsylvanian Meadow Mouse <i>Microtus pennsylvanicus</i>	C	X	X	X	
Montane Meadow Mouse <i>Microtus montanus</i>	C	X	X	X	
Long-tailed Meadow Mouse <i>Microtus longicaudus</i>	U	X	X	X	
Beaver <i>Castor canadensis</i>	Ca	X		X	
Porcupine <i>Erethizon dorsatum</i>	U			X	X
Coyote <i>Canis latrans</i>	C	X	X		X
Kit Fox <i>Vulpes macrotis</i>	U				X
Long-tailed Weasel <i>Mustela frenata</i>	C	X	X	X	X
Mink <i>Mustela vison</i>	R			X	
Badger <i>Taxidea taxus</i>	U		X	X	X
Striped Skunk <i>Mephitis mephitis</i>	C	X	X	X	
Spotted Skunk <i>Spilogale gracilis</i>	U		X	X	
Bobcat <i>Lynx rufus</i>	U			X	X
Mule Deer <i>Odocoileus hemionus</i>	C			X	X

there were 20 to 30 major trappers working the environs of Utah Lake. During the 1976–77 season there were 10. In addition to these men, there have been up to 100 young boys also trapping muskrats.

One of the trappers indicates that he now traps 15 to 20 "rats" with the same effort that it took him to trap 200 to 250 10 years ago. In times past he would trap about 800 muskrats per year; last year he trapped just over 800.

The decrease in available wild furs nationwide has also had an impact on the price of muskrats. The lowest price they could remember was 19¢ for large prime pelts. The current rate is \$4.40 for the same pelt.

BIRDS

Utah Lake is the largest natural freshwater

body in Utah. It is a shallow lake with shoreline communities varying from swampy areas with emergent vegetation to rocky and sandy beaches. The various plant communities as well as the beaches provide valuable habitat for many species of birds. Although Utah Lake is probably not as productive an area for birds now as it was before the white man came to the valley, it is still an important resource for avian species.

Dominguez and Velez de Escalante, on their expedition of 1776, are credited with being the first white men to see Utah Lake. In their journal (Chavez and Warner, 1976:60) the following description is given:

This one of the Timpanogotzis abounds in several species of good fish, geese, beavers, and other amphibious creatures which we did not have the opportunity to see. Round about it reside the Indians mentioned, who live on the lake's abundant fish, whence the Sabuagana Yutas called them Fish-eaters. Besides this, they gather



Fig. 2. Double-crested Cormorant. Photo, United States Steel Corporation.

the seeds of wild plants in the bottoms and make a gruel from them which they supplement with game of jack-rabbits, coneys, and fowl, of which there is a great abun-

dance here. They also have bison handy not too far away to the north-northwest, but fear of the Comanches prevents them from hunting them [*italics added*].

Shortly after the Mormon pioneers entered the Salt Lake Valley in 1847, exploring parties were sent out to scout the area for future settlements because more people were expected to come west. Utah Valley and Utah Lake were seen and explored during the first year the pioneers were in the Great Basin. The early pioneer diaries of those who settled Provo and the surrounding areas attest to the abundance of fish and waterfowl in and around the lake.

The settling of Utah Valley had had a marked effect on animal populations in the valley and in the lake. The avian species using the lake and the surrounding areas have probably been disturbed as much as any of the organisms, with the exception of the fish within the lake. Most of the changes in the avian populations have been due to the encroachment of man upon the breeding and feeding habitats. In one or two instances, human agricultural activities have provided more habitat suitable for breeding and feeding purposes. When the settlers first came to the valley they were probably very few Robins as compared to present-day populations. Agricultural use of the land has been helpful in providing habitat for the introduced Ring-necked Pheasant and has provided a larger breeding and feeding area for the native Western Meadowlark.

Habitat and Species Destruction

As more and more people settled in the valley, five conditions arose that were harmful to many species of birds found on and around Utah Lake: (1) Until about 1960 raw sewage from the many cities and towns around the lake was dumped into its waters without any treatment. As the water became highly polluted the effectiveness of the lake as a habitat for birds decreased. Pollution in the lake has been reduced now that sewage treatment facilities have been constructed by the municipalities that dump their wastewater into the lake. (2) As the population of the valley increased, industrial organizations were attracted to the valley. Their by-products, including hot water, were frequently discharged either directly into the lake or into streams that emptied into it. In recent years much effort has been expended by the

various industrial establishments to curtail harmful products and thermal pollution from entering the lake. (3) Another condition that had an adverse effect on Utah Lake bird populations was the erroneous belief that many of the fish-eating species were feeding on the game fish of the lake. There was actually a drive to exterminate fish-eating birds. This was published in the local newspapers during the 1930s. (4) Around the turn of the century market hunting was a way of obtaining a livelihood for many individuals who lived near bodies of water that supported duck populations. Utah Lake was no exception, and a number of the local residents derived their income from hunting ducks, geese, and shore birds. (5) Probably the most consistent adverse factor has been the continuous harassment of nesting and feeding species by many individuals, both singly and collectively.

During the 1930s Robert G. Bee, a local amateur naturalist, became interested in obtaining from some of the older residents of Utah Valley their recollections of the lake and its fish and bird life. By interviewing a number of men who had fished, trapped, and hunted on and around the lake he assembled some interesting information. These interviews, plus his field notes that he kept over the years, are in the Monte L. Bean Life Science Museum at Brigham Young University (Bee 1924-1962). The following paragraphs summarize information concerning the killing of fish-eating birds, market hunting, and general harassment of the birds at Utah Lake.

During the last decade of the nineteenth century and continuing well into the third decade of this century the killing of many fish-eating birds was considered to be a conservation measure. Bounties were fixed by many of the fish and game departments in the various states and, upon presenting the heads or feet of the offending species to the game officers, the bounty was paid. Bee (1930-1940) records the following from Gus Slade of Lehi, Utah:

In the year 1896 or 7 there was a bounty paid on fish-eating birds: heron [probably Great Blue Heron], pelican, bittern, quok [probably Black-crowned Night Heron], fish duck [Mergansers], hell divers [probably Western Grebe], loon, black-gebe [probably White-faced Ibis], coromorant (*sic*). At one time the heron [probably

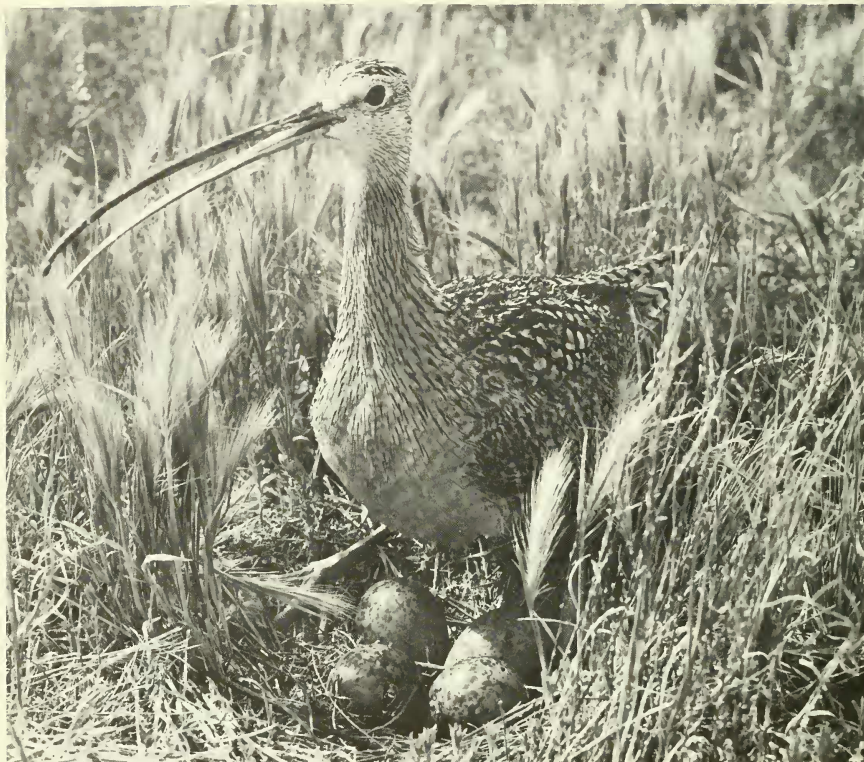


Fig. 3. Long-billed Curlew. Photo by R. J. Erwin.

Great Blue Heron] was so numerous that they used the cedar trees for nesting. In 1882 their colonies covered an area of three or four miles long and a mile or so wide in a solid mass. There were probably 100,000 of them along a low ridge in the vicinity of Soldier Pass and Goshen Pass. Al Jorgensen, Jake Westphal and myself went to a colony of the Blue Heron in the Goshen Slough. Water was about one and half feet deep. Where the rookery was the rushes, about seven feet high, were matted down to the level of the water. We took our pants off and begun work. Breaking their necks with a stick we cut their heads off, placed them in sacks, and loaded them into boats. There were four or five acres of these birds and their heads were erect like so many sticks. We loaded 1,290 heads for which we received \$129.00 bounty.

This was not an isolated instance of bounty hunting. Ad Robbins of Provo related to Bee that:

Asa Carter and I made the biggest money on the lake killing "quoks" and cranes [Black-crowned Night Herons

and Great Blue Herons]. . . . we were at the rookery before daylight collecting heads and eggs. At daylight we begun to shoot. . . . About the year 1890 George Hone R. A. Barney, W. Safford and myself killed nesting pelicans. Never saw a worse mess in all my life. There were about 1,000 of them until the smell made us all sick [this was at Rock Island, Utah Lake].

At a later date Goodwin (1904) visited the colony and hinted that there might have been harassment of the pelicans prior to his visit. He stated (p. 127):

The first thing that forced itself upon our attention, even before we landed was the dreadful nauseating odor. With dead birds, old and young, *by the scores* scattered over the island. . . . [italics added]

In colonial species it is not uncommon to see a few young and adults dead, the result of natural mortality, but not to find "scores" as Goodwin stated. He mentioned that other in-

dividuals had visited the colony a few days prior to his visit so that the possibility of killing should not be ruled out.

Pete Johnson, of Provo, indicated that he could average \$6-\$7 per day by killing fish-eating birds and obtaining the bounty for them. He indicated that Jake Westphal (mentioned above) made from \$41 to \$42 per day from the bounty.

Another one of the early hunters (Claude Carter) reported:

There was a bounty paid on cranes and heron in 1895. Two men could make as high as \$66 a day. Wading into the rookeries with their pants off they would crack the heron over the head. When the bounty was paid on pelican we would use a fish float tide to a wad of rushes. Gulls were also caught. There has been 10,000 slaughtered. At the Big Channel gulls have been shot and there are four or five hundred pelicans which have been shot. In 1928 I killed 1,240 mudhens [Coot]. We would eat the hearts and gizzards, take the feathers and oil, and discard the rest.

The amount of destruction carried on in the name of conservation will probably never be really known.

Concurrently with the destruction of fish-eating species was market hunting of waterfowl. This was a widespread activity in the United States at the turn of the century. Many of the individuals involved in bounty hunting on Utah Lake were also the market hunters. Mr. Slade indicated that on good days he could shoot from 125 to 150 ducks per day. A number of the other market hunters indicated from their experience that this was too high. Averaging five hunters' figures ranging from Slade's 125 per day to 35 per day gives a mean of about 75 ducks per day per hunter. We do not know how many people were involved in this activity, but one can see that if a dozen or more men were market hunting on Utah Lake the take could be from 900 to 1000 birds per day. Prices varied with the size of the ducks. Smaller teal averaged about \$1.00 to \$1.25 per dozen, and the larger ducks went for \$1.75 to \$2.00 per dozen. Feathers were also sold for around 60¢ per pound. Ad Robbins gives us an interesting picture of the daily activities of a market hunter:

I would hunt until 10 a.m. and pack the kill 1½ miles. Then I would pick the ducks and load 50, 70, or 100 shells until two or three o'clock in the morning. Then I

would go to the boat and sleep until it was light enough to shoot.

As time went on, the populations of waterfowl decreased until their numbers became so few that many individuals realized that some types of controls would need to be imposed to preserve our wildlife. The outcome of this thinking was the passing of laws that limited the numbers and the length of time that a particular species could be hunted. With the coming of these restrictions market hunting became only a thing to reminisce about.

Wherever man has settled, wildlife in the area has been subjected to harassment. The previous paragraphs show some of the more intensive types of disturbances that occurred on Utah Lake. Concurrent with these activities and continuing into the present has been the harassment of wildlife just for "fun." This type of activity took many forms and usually occurred sporadically. The occasional disturbing of a nesting group of birds by someone invading their area, the potshot of a boy with rifle or shotgun, or any other act that would disturb the birds from carrying on their normal activities would fit into this category. These interruptions are by far the hardest to quantify because of their random nature, yet when accumulated over a given period of time, they are probably the most damaging to the birds. This type of activity is not only confined to the past but also occurs now. On several occasions during the summer of 1976, Brigham Young University personnel conducting research on the colonial nesting species at the lake found birds that had been shot and then left to rot on the ground below their nests.

Changes in Bird Populations

In addition to his direct influence on bird populations, man has affected bird habitats by changing the water level in the lake. There are two types of water level changes. One involves a yearly high period, usually in May or June, followed by a low period in September or October; the second type of fluctuation occurs over a period of years. The yearly fluctuation, unless it is very great, does not have too much effect on the habitat. Considerable change has been observed during the years of continued low water levels



Fig. 4. Black-necked Stilt. Photo by R. D. Porter and R. J. Erwin.

followed by the water level rising and flooding plants that have invaded the dried-up areas. In the past 45 years (1931–1976) there have been two periods of low water. During

the years 1932–1942 the lake was at its lowest point ever recorded. In the 1961–1964 period the lake level lowered again but not as much as in the earlier period.

In the mid 1930s Provo Bay was subjected to channelization. This resulted in the water being confined to narrow canals, with much of the area exposed. No attempt was made to maintain the channels or to install headgates to regulate the water flow because of protests by local conservation interests (*Evening Herald*, 15 April 1936:1,8). During this period farmers along the shore extended their grazing operations out into areas that 20 years before had been under water. Fence lines were extended out to contain the cattle, and considerable plant growth developed along the fence rows. In time the low-growing vegetation was replaced by willows and poplars, which attained considerable size. On the banks along the canals, poplar and willow trees became numerous. On the flat areas of Provo Bay and around Utah Lake brushy expanses of willow and tamarisk became established.

In the 1940s, as the level of the lake rose, the willows and tamarisk were first to be inundated. These partially submerged plants provided breeding habitat for Western Grebes, American Coot, Long-billed Marsh Wrens, Yellowthroats, Yellow-headed Blackbirds, Red-winged Blackbirds, and other species. Since the banks along the canals were higher as the result of the dredged materials, the willows and poplars were out of water and continued to grow into the 1950s and 1960s. As the trees matured into large, well-formed structures, they provided nesting habitat for the colonial Double-crested Cormorants and Great Blue Herons. In parts of Provo Bay the thickets of willow and tamarisk also provided habitat for Snowy Egrets, Black-crowned Night Herons, and White-faced Ibis. Colonies of these three species became very extensive with the availability of protected nesting areas. Along the east side of Provo Bay, about a mile south of the mouth of Hobble Creek and about the same distance north, two fairly extensive rows of trees developed along existing fence rows. The trees along the north were used by Great Blue Herons until they fell or were blown over. Those along the south were not used extensively until the 1960s, when the trees at the western end (and in deeper water) were used by Double-crested Cormorants and

those eastward in the row by Great Blue Herons. As the trees at the western end commenced to die, rot, and fall over, the cormorants nested more in the eastern part of the row and encroached on the herons. At the present time (1980) cormorants and herons are using the remaining trees together, with some herons moving about a half mile northward to a very tall stand of trees barely at the water's edge.

The status of the 200 species at the lake is not completely known. No doubt there is less nesting habitat around the lake now as compared to when the white man arrived in the valley in 1848. With a decrease in habitat and a great increase in use of the lake for recreation, there has probably been a decrease in number of birds that can utilize the lake and its environs for breeding, resting, and feeding. There is enough information at hand to discuss the population changes in about 20 species.

White Pelicans have used Utah Lake as a food source as far back as we have records. They once nested here, as has been mentioned, but no longer do so due to human harassment. They now nest on Gunnison Island in the Great Salt Lake and fly to Utah Lake for feeding and resting purposes only. The Double-crested Cormorant populations during the past 40 years have fluctuated considerably. Though numerous in the 1930s and 1940s, a decline occurred during the 1950s and 1960s. During the past decade there has been an increase in their numbers. Mitchell (1977) indicated that 54 percent of the known nesting colonies of cormorants in Utah occurred around Utah Lake. Great Blue Herons have been fairly numerous on a continuous basis around the lake. The location of their colonies has changed as they have been subjected to the influence of man. Early reports indicated that they nested in the bulrushes and a few nested in trees. Now, in the Utah Lake area, they nest almost exclusively in trees (see earlier reports). At Bear River Refuge, where their nesting habitat is protected, they still nest in the bulrushes. Harassment has probably been the major reason for the change in nesting habitat.

A comparatively new arrival in Utah and the Utah Lake area is the Cattle Egret. The



Fig. 5. Common Snipe. Photo by R. J. Erwin.

first record of the Cattle Egret at Utah Lake is 16 April 1971, when Hayward and Frost saw one in the wet meadow at the north Springville freeway exit (Hayward et al. 1976). From time to time since then one or more have been observed. During the summer of 1976, three pairs were seen and believed to have nested with a colony of Snowy Egrets south of the airport. Dennis Shirley, Utah State Division of Wildlife Resources, reported (pers. comm.) that in May 1980 about 25 Cattle Egrets nested with Snowy Egrets and Great Blue Herons in the same locality. For many years White-faced Ibis have been found around the lake where they feed in the wet meadows, but they were not known to breed here. In 1971 and 1972, Kaneko (1972) found a good-sized colony nesting in Provo Bay. They have been observed each year since then.

Henshaw (1875) considered the Bald Eagle to be a permanent breeding species around the lake. Now this species is found here primarily in winter, and then only occasionally is it seen. Most of the wintering population is located in the arid valleys west of Utah Lake. Porter et al. (1973) concluded that the de-

cline of the Peregrine Falcon in Utah was due to a combination of climatic changes and pesticide contamination. The Ring-necked Pheasant was introduced into the fields around Utah Lake in 1922, when a pheasant farm was commenced by the Division of Wildlife Resources (Cottam 1929b). The Chukar, another introduction by the Division of Wildlife Resources, was first released in Utah in 1936 (Hayward et al. 1976). A few have been observed around the airport dike from time to time.

The Sandhill Crane formerly bred in suitable marsh habitat around the lake and was known to breed in this area as late as 1939 (Bee and Hutchings 1942). At the present time this crane is a migrant in the Utah Lake area. The Common Gallinule has been reported from around the lake several times. In May 1969 Hayward saw three at Powell's Slough, and, due to their continued presence over a period of time and to their courtship behavior, considered them to be breeding (Hayward et al. 1976). The Long-billed Curlew, although still present in small numbers, is not as plentiful as it was 40 or 50 years ago. This decrease is due primarily to the re-

duction of its breeding habitat by man's use of the land.

California Gull populations are probably higher now than in pioneer times. Human activities have provided a greater variety of food sources than was present formerly. Plowed fields are a good source of insects, cherries are used as a food supply (Cottam 1935), and the ever-present city dump and land fill operations are used by gulls as a food source. Breeding areas are adequate to sustain a large population. Cottam (1935) and Beck (1942b) reported great numbers using Rock Island as a breeding ground. As the water level went up and the available area on Rock Island became smaller, the gulls moved to the dikes in the cooling ponds at the United States Steel Plant at Geneva on the east side of the lake. Yearly, thousands of gulls nest on the dikes, where they are near all the food sources mentioned.

The Caspian Tern has not fared as well as the gulls. As long as there was an extensive land mass on Rock Island, gulls and terns were able to nest together there. As the land mass decreased in size, the terns were unable to compete with the gulls for nesting habitat, were preyed upon by the gulls, and so stopped nesting on the island. At the present time no colony of Caspian Terns is known to nest around the lake, although they still nest in the refuges around the Great Salt Lake.

A number of the small song birds are more common now than they were before the settlement of the valley. Pasture and hay fields have provided greater habitat for the Meadowlark. Plantings of trees and shrubs around homes and the development of city parks has increased the nesting habitat for the American Robin, Black-headed Grosbeak, and House Finch. Barns, outbuildings, and bridges are used extensively by Barn and Cliff Swallows for nesting purposes. Henshaw (1875:2) specifically mentioned the Robin as being more abundant than when the settlers first arrived.

The Blue Grosbeak is more common around the lake than formerly. Several have been observed in the vicinity of the lake over the past 15 years. This species is found more commonly in the southern and eastern parts of Utah. Two introduced species, the House Sparrow and Starling, are now common resi-

dents of the lake environs. Sparrows were introduced into many parts of the United States and were reported in Utah prior to 1870 (Hayward et al. 1976). The Starling is a more recent arrival, first reported in the Utah Lake area during the winter of 1951-1952 (Behle 1954). Both species are very adaptable and have, in some instances, replaced the native bird fauna. Formerly the Common Crow was a sparse breeder around the lake. Bee and Hutchings (1942) and Richards and White (1963) reported a nest at the mouth of Hobbie Creek in the month of May. Richards (1971) indicated that the eastern race *Corvus brachyrhynchos brachyrhynchos* is the subspecies found in the valley. At the present time the crow is a winter visitant, being found here from November through February and March.

Early Reports on Avian Species (1872-1905)

As mentioned previously, the first recorded white men to observe bird life around Utah Lake were Dominguez and Velez de Escalante and their associates in 1776. During the next 100 years we know very little about bird life around the lake except for scattered statements in some of the pioneer diaries. In 1872, H. W. Henshaw and H. C. Yarrow accompanied a geographical survey party that spent some time in Utah Valley in July and November and December.

Henshaw (1875), in describing some of the ducks they saw and collected at Utah Lake, indicated that they were plentiful. He reported that

[italics added] the borders of Utah Lake afford a home in summer for *very many* of these ducks [Gadwall, p. 447].

In writing about the Cinnamon Teal, which he called the "Red-breasted Teal," he wrote

In Utah, I learned from good authority that it breeds in *great numbers*, especially in the marshes of Utah Lake [p. 478].

He wrote about the Greater Blackhead [Greater Scaup]

Among the *hordes of ducks* seen at Utah Lake in November, the presence of this species was recognized and several were shot [p. 479].



Fig. 6. Black Tern. Photo by R. J. Erwin.

and the Goldeneye

visits the neighborhood of Utah Lake in *great abundance* during the fall, and is, I think, a winter resident [p. 480].

The Red-breasted Merganser he considered

rather common at Utah Lake in November, more so than either of its congeners [Hooded or Common Mergansers, p. 484].

The American Wigeon

occurs in *great abundance* on Utah Lake during the fall, where it is found in considerable numbers even late in November, and, indeed, in the neighborhood of certain warm springs and sloughs about Provo, more or less may find sufficient inducement to keep them all winter [p. 475].

Besides the ducks, Henshaw (1875) mentioned the presence of a number of other spe-

cies, which gives us a better picture of the bird life around the lake over 100 years ago. His statements are as follows:

Common Loon [called by Henshaw the Great Norther Diver]

was said by fishermen of Utah Lake to be *rather common*, remaining in their waters till quite late in the fall [p. 488].

Western Grebe

is a *common species* of Utah Lake in summer perhaps the most so of the family; and breeds here [p. 466].

White Pelicans [American Pelican]

were seen at Utah Lake in July *sparingly* [p. 485].

Great Blue Heron was seen

on the borders of Utah Lake as late as December, and it probably remains there through the winter [p. 464].



Fig. 7. Spotted Sandpiper. Photo by R. D. Porter.

Black-crowned Night Heron [Night Heron]

appears to occur *commonly* in Utah about the large lakes and marshes. As it was seen about Utah Lake in December, it probably is a resident [p. 466].

White-faced Ibis [Glossy Ibis]

is well known to the gunners about Utah Lake under the name of "Black Snipe." It is said to be *common* in spring and fall, and may, I think, breed in this vicinity [p. 463]

Rough-legged Hawk [Black Hawk]:

None were obtained until we reached Provo, where it was the most numerous of the hawks. Utah Lake and the surrounding marshes attract *multitudes of waterfowl*; and this undoubtedly explains in part the abundance of hawks at this season, since wounded and disabled ducks must form no inconsiderable part of their food [p. 426].

Bald Eagle [White-headed Eagle]

is *numerous* in Utah, perhaps more so than is usual in the West, as the presence of several large lakes well stocked with fish attract it. It regularly visits the shores of Utah Lake from the adjoining mountains, where it finds opportunities for rearing its young undisturbed, within easy reach of the lake [p. 427].

Marsh Hawk was

near Utah Lake, their *numbers were scarcely less* than were the Rough-legged Hawks [p. 416].

Ring-billed Gull

is *common* on the larger bodies of water throughout Utah. Numbers were seen on the Provo River late in November, when the lake was frozen over. They are without doubt winter residents here [p. 485].

Forster's Tern [Howell's Tern]

was *quite common* at Utah Lake in the summer, where it breeds along the shores [p. 486].

Long-billed Marsh Wren:

In the extensive marshes which border Utah Lake, and which are covered with a dense growth of coarse grasses and reeds, these wrens were *exceedingly numerous*; and, in breaking a path through the reeds, which often are so dense as to render progress well nigh impossible, *hundreds* of these little birds were startled up from their retreats, while their harsh notes were heard on all sides in expostulation. Almost as numerous as the birds themselves were their nests, which were seen on all sides, suspended on the tall, waving stems [p. 186].

Robin:

At Provo, it was *very common*, where a few years since it was unknown; the advent of this, as of several other well known birds, following the occupation of the soil and its subsequent tillage by the settlers [p. 143].

Tree Sparrow:

The species was found *common* at Provo in December [p. 277].

Bobolink:

is a *rather common* bird in the fields about Provo, Utah, where the parent birds were noticed feeding their young July 25 [p. 311].

Common Crow

met with only at Provo, where a number were seen at different times. Said by the settlers to have appeared within a few years [p. 327].

During the next 30 years there is a paucity of information concerning the bird life of Utah Lake. In 1892, H. C. Johnson, a resident of American Fork and an interested oologist, collected eggs of the following species of birds in Powell's Slough: Bittern, Blue-winged Teal, Snipe, Sora Rail, Coot, Long-billed Marsh Wren, and Yellow-headed Blackbird. The following year Johnson (1893) reported seeing a loon on the lake and collected eggs of the Bittern, Mallard, Wilson Snipe, Coot, Long-billed Marsh Wren, and Yellow-headed Blackbird. He also observed Great Blue Herons nesting in Springville Lake (Provo Bay) and stated that they were on an island which was

simply covered with Great Blue Herons and we counted about 60 nests built flat on the tules (there being no trees in that part of the country).

He found in the same locality nests of the Western and Eared Grebes.

A decade later the Rev. S. H. Goodwin (1904) of Provo visited Rock Island in Utah Lake and reported that a colony of White Pelicans was nesting there. He estimated there were about 200 young on the island. He noted that California Gulls and Forster's Terns were residents of the island along with the pelicans.

About the same time that the Rev. Goodwin had visited Rock Island, A. O. Treganza of Salt Lake City visited a Western Grebe colony on Utah Lake. He collected a set of eggs that eventually became part of the egg collection of E. J. Court of Washington, D.C. Court loaned this set of eggs to Dr. R. W. Shufeldt, who was making a study of the eggs of loons and grebes. In 1914 Dr. Shufeldt published his findings and reported on the Western Grebe eggs collected by Treganza:

The colony of grebes, where these eggs were collected, was located about two miles from the shore, and contained about one hundred nests. Some of the clutches were in advanced incubation.

The eggs were collected on 29 May 1904.

Recent Reports on Avian Species (1905-present)

Cottam (1927), in an annotated list, mentioned a number of species in and around the lake. The published account of his thesis

(Cottam 1929c) listed 72 water birds known to occur in Utah County. He regarded 29 as breeding birds, 33 as occurring in the winter, 39 as common migrants, and 15 as residents. These lists were based on his field work, collected specimens, and from the literature.

During this same period of time Cottam participated with the National Audubon Society in their annual Christmas census of birds. The results (Cottam 1928, 1929a) showed that in 1928 his party saw 51 species and 1971 individuals and in 1929 they saw 59 species and 2588 individuals. Both surveys were in the lake area.

Commencing in the 1930s and continuing to the present, much has been written concerning the avifauna of the lake. Unfortunately this material is scattered in many publications, where sometimes it is incidental to the main theme of the publication. Some material (field notes and observations) has been collected but has not been published. The following brief summary of the literature from 1930 to the present will be given. For convenience it has been arranged into three categories: (1) Papers and reports published in nationally recognized journals and periodicals, (2) those found in periodicals of local interest and distribution, and (3) unpublished data.

Two short notes by Allen (1936, 1937) indicate several species nested on the lake and state that pelicans were still being shot indiscriminately. C. Lynn Hayward served as a warden for the National Audubon Society in 1936 (personal interview) and Reed Fautin, then a graduate student at Brigham Young University, carried on the warden patrol of pelicans, avocets, and long-billed curlews in 1937 (Allen 1937). Beck (1942a,b, 1943, 1947) added considerable information to the status of gulls on the lake. His 1942a paper indicated that six species of gulls frequented the lake, and the 1942b publication gave detailed observations of the breeding ecology of the California Gull on Rock Island. He estimated the 1942 postnesting population of gulls to be 68,744. His third paper described the plumage changes that occur in California Gulls from hatching to maturity. The 1947 report was a popular account of the 1942b publication on the breeding biology of the gulls (1942).

Bee and Hutchings (1942) listed 47 species as nesting around the lake. Behle (1942, 1945, 1966) specifically mentioned a number of birds at Utah Lake. The 1942 and 1966 papers listed one species each from the lake (Sanderling and Wood Duck). The 1945 publication listed 13 species seen at Rock Island in 1932 and indicated that 6 species were nesting on the island at that time. Cottam (1941) reported collecting a LeConte's Sparrow near Utah Lake in December 1927 for the only collected specimen known for the state of Utah. During the spring and summer of 1937 Fautin (1940, 1941a,b) carefully studied two colonies of Yellow-headed Blackbirds near the mouth of Provo River. His report gives a good ecological picture of this species at Utah Lake.

Hayward (1935a,b, 1936, 1937, 1944, 1966) contributed a number of studies on the status of birds at Utah Lake. The 1935a paper gave information on the Caspian Tern for a six-year period (1927–1933) on Rock Island. His second paper compares bird life in Bear Lake and Utah valleys and mentions a few water birds at Utah Lake. The 1936 publication gives observations on 14 species of shore birds seen during the summer of 1936 at the lake. The remaining papers report the presence of isolated species at the lake.

Hayward, Cottam, Woodbury, and Frost (1976) contributed considerable information concerning the species found on and around the lake.

Johnson (1935a,b) reported collecting two Snow Buntings near the mouth of Provo River. Kingery (1974, 1976) recorded the Common Tern around the lake in April 1974 and June 1976. Lockerbie (1947) sighted two Brown Pelicans in a flock of White Pelicans on Utah Lake in April 1947. Mitchell (1975) reviewed the status of the Double-crested Cormorant in Utah and gave data on the colonies around Utah Lake. Mitchell (1977) reported a study of the breeding biology of the Utah Lake Cormorants. Scott (1968) reported a Red Knot at Utah Lake 11 May 1968, the only report of this species for the lake. Webb's Christmas bird counts for the Audubon Society (1973b, 1974b, 1975a, 1976, 1977b, 1978c, 1979b) mentioned a number of species of water birds found at the lake dur-

ing the seven years mentioned. Four rare species reported at Utah Lake by Kingery (1977) were the Red-necked Grebe, White-winged Scoter, Sabine's Gull, and Common Grackle. Migrant species (Franklin Gull, Blue-gray Gnatcatcher, and Orange-crowned Warbler) lingering at Utah Lake into December 1977 were recorded by Kingery (1978).

Among the publications of local interest and distribution are publications by the Division of Wildlife Resource, Utah Audubon Society, and Mount Timpanogos Audubon Chapter of the National Audubon Society. Jensen (1974), in a section that deals with Utah County, gives information on land ownership and vegetative cover in the Provo and Goshen Bay areas of Utah Lake and also the hunter use and numbers of geese and ducks hunted in the county.

The Utah Audubon Society, with headquarters in Salt Lake City, has published for many years the *Utah Audubon News*. From 8 to 12 numbers have appeared each year, and many of the issues contain references to birds around Utah Lake. For a number of years annual field trips by the society were taken to many areas in the state. One of these annual trips was to Utah Lake and was reported in the *Utah Audubon News*. The number of individual birds seen, as well as the different species observed, was recorded and gives a picture of the bird life around the lake. Casal (1966), Ferris (1965), Geoghagen (1965), Kashin (1957, 1959, 1960, 1961, 1962, 1963, 1964), Lockerbie (1955a,b), Lockerbie and Behle (1952), Stone (1968), Tainter (1956), and Weissman (1968) published information on Utah Lake bird life. From these reports we know that a Great Blue Heron colony existed in the north part of the lake from at least 1955 to 1962, since it is mentioned a number of times during this time period. The earliest is Lockerbie (1955a), who reported 21 herons standing in their nests in the spring of 1955. Kashin (1960) reported two Great Blue Heron colonies with a total of 50 nests.

The Mount Timpanogos Chapter of the National Audubon Society, at Provo, Utah, has published since late in 1972 the *Timpanogos Honker*, which has contained articles dealing with birds at the lake. Simmons (1974) reported the presence of a Cattle

EGRET at the lake in April 1974. Webb (1973a, 1974a, 1975b, 1977a, 1978a, 1979a, 1980) reported the results of several local Christmas bird counts with, in some instances, more information than appeared in the American bird accounts. Webb (1977c) observed a Mockingbird late in October 1977 at the lake. In December of the same year he (1978b) saw five species of shorebirds that normally migrate earlier in the season. Two anonymous reports (1978a,b) and short notes by Johnson and Webb (1977) and Monroe (1979) listed common species observed at the lake during field trips taken by the Mount Timpanogos Chapter of the Audubon Society.

Three sources of unpublished information on Utah Lake that contain valuable information are field notes, master's theses, and data cards on the egg collections in Monte L. Bean Life Science Museum at Brigham Young University. The field notes of R. G. Bee (1924-1962), C. L. Hayward (early 1930s-present), and H. H. Frost (1960-present) contain valuable notes on birds and some of the bird colonies around the lake.

A number of master's theses deposited at Brigham Young University give further information on the bird life of the lake. Cottam's thesis (1927) was cited above. Murphy (1951) studied the birds wintering along the east shore of the lake south of the mouth of Provo River and adjacent to the Provo Airport (October 1950-March 1951) and reported 24 species of passerine birds wintering in the area, including 21 winter visitants, 8 permanent residents, 4 summer residents, and 2 migrants. Talley (1957) studied the nasal mites of overwintering Red-winged Blackbirds and Brewer's Blackbirds found along the north shore of Provo Bay. Barnett (1964) studied the waterfowl nesting at Powell's Slough and found only 6 species. He concluded that lack of good marsh habitat, fluctuating water levels, and cattle and predator destruction of the nests were limiting factors in waterfowl production. He also listed the seasonal distribution of 26 other species that frequented the marsh. Kaneko (1972) reported the nesting of White-faced Ibis in the Provo Bay area. This was followed by Mitchell's



Fig. 8. Wilson's Phalarope. Photo by R. J. Erwin.

(1974) study on the Double-crested Cormorant in the Provo Bay area and at Geneva Dike and Gunnell's (1976) study of the Snowy Egret in the same two localities. Isham (1975) discussed the spacial distribution of the nests of the Black-crowned Night Heron and the Snowy Egret and obtained some of his data from the colonies in Provo Bay and at the Geneva Dike. Alford (1978) obtained some prenesting behavior data from a colony of White-faced Ibis located in the Provo Bay area of Utah Lake.

Earlier in this century bird egg collecting was a popular avocation. Some of these collections were very well prepared and, in addition to the eggs themselves, data were kept with each set of eggs indicating the date collected, general location, specific nesting habitat and, frequently, the nesting materials, and other bird species nesting in the same locality. BYU's Monte L. Bean Life Science Museum has a number of collections made by in-

dividuals in Utah that specifically designate Utah Lake as the collecting locale. This information is very valuable in giving us a picture of some of the nesting birds around the lake (see Table 2).

BIRD POPULATIONS AT UTAH LAKE

In summarizing the information found in the printed reports and the unpublished data, an understanding of the avifauna of Utah Lake emerges. Two hundred species of birds have been reported from the lake and its surroundings, representing 46 families (Table 2). Table 3 indicates the relative abundance of these species.

The habitats around the lake have been placed into five groups. Many of the 200 species are not restricted to a single habitat but may be found in two or more areas. Table 4 shows the habitat preferences of the birds at the lake.

TABLE 2. Birds of Utah Lake, their relative abundance, seasonal occurrence, and habitat preferences.

Abundance							
A	Abundant—Will usually be seen				(75–100 percent of time)		
C	Common—May not be seen each time in the field				(25–75 percent of time)		
U	Uncommon—Will only be seen occasionally				(10–25 percent of time)		
Ca	Casual—Only seen once in great while				(less than 10 percent)		
R	Rare—Reported only once or a very few times				(less than 1 percent)		
Seasonal Occurrence							
M	Migrant				SR +	Summer resident, a few wintering	
M +	Migrant, occasionally remaining in area				WV	Winter visitant	
PR	Permanent resident				Jan	Month or season when only seen once	
SR	Summer resident						
*Breeding				**Introduced			
Name	Habitats						
	Abundance	Seasonal occurrence	Open water	Marshy land	Beaches	Wet meadow	Dry meadow
Family Gaviidae							
Common Loon <i>Gavia immer</i>	C	M	X				
Family Podicipedidae							
Red-necked Grebe <i>Podiceps grisegena</i>	R	May	X	X			
Horned Grebe <i>Podiceps auritus</i>	Ca	M	X	X			
*Eared Grebe <i>Podiceps nigricollis californicus</i>	A	SR +	X	X			
**Western Grebe <i>Aechmophorus occidentalis</i>	A	SR +	X	X			
*Pied-billed Grebe <i>Podilymbus podiceps podiceps</i>	C	PR	X	X			
Family Pelecanidae							
*White Pelican <i>Pelecanus erythrorhynchos</i>	C	SR	X	X			
Brown Pelican <i>Pelecanus occidentalis</i>	R	Apr	X	X			
Family Phalacrocoracidae							
*Double-crested Cormorant <i>Phalacrocorax auritus</i>	C	SR +	X	X			
Family Ardeidae							
*Great Blue Heron <i>Ardea herodias treganzai</i>	A–C	SR +	X	X	X		
*Cattle Egret <i>Bubulcus ibis ibis</i>	Ca	SR	X	X	X		
Common Egret <i>Casmerodius albus egretta</i>	R	Summer	X	X	X		
*Snowy Egret <i>Egretta thula brewsteri</i>	C	SR	X	X	X	X	

Table 2 continued.

Name	Habitats						
	Abundance	Seasonal occurrence	Open water	Marshy land	Beaches	Wet meadow	Dry meadow
*Black-crowned Night Heron <i>Nycticorax nycticorax hoactli</i>	C	SR +	X	X			
*American Bittern <i>Botaurus lentiginosus</i>	U	SR +		X			
Family Ciconiidae Wood Stork <i>Mycteria americana</i>	R	Summer		X			
Family Threskiornithidae *White-faced Ibis <i>Plegadis chihi</i>	C	SR +		X		X	
Family Anatidae Whistling Swan <i>Olor columbianus</i>	Ca	WV	X	X			
*Canada Goose <i>Branta canadensis</i>	C	SR +	X	X		X	
White-fronted Goose <i>Anser albifrons</i>	R	Apr & Nov	X	X			
Snow Goose <i>Chen caerulescens caerulescens</i>	U	M	X	X			
*Mallard <i>Anas platyrhynchos platyrhynchos</i>	C	PR	X	X			
Black Duck <i>Anas rubripes</i>	R	WV	X	X			
*Gadwall <i>Anas strepera</i>	C	PR	X	X			
*Pintail <i>Anas acuta</i>	C	PR	X	X			
*Green-winged Teal <i>Anas crecca carolinensis</i>	C	PR	X	X			
*Blue-winged Teal <i>Anas discors discors</i>	C-U	PR	X	X			
*Cinnamon Teal <i>Anas cyanoptera septentrionalium</i>	C	SR +	X	X			
American Wigeon <i>Anas americana</i>	U	SR +	X	X			
*Northern Shoveler <i>Anas clypeata</i>	C	SR +	X	X			
Wood Duck <i>Aix sponsa</i>	R	Nov	X	X			
*Redhead <i>Aythya americana</i>	C	SR +	X	X			

Table 2 continued.

Name	Habitats						
	Abundance	Seasonal occurrence	Open water	Marshy land	Beaches	Wet meadow	Dry meadow
Ring-necked Duck <i>Aythya collaris</i>	Ca	WV	X	X			
Canvasback <i>Aythya valisineria</i>	C	SR +	X	X			
Greater Scaup <i>Aythya marila nearctica</i>	Ca	M	X	X			
Lesser Scaup <i>Aythya affinis</i>	C	M	X	X			
Common Goldeneye <i>Bucephala clangula americana</i>	C	WV	X	X			
Barrow's Goldeneye <i>Bucephala islandica</i>	Ca	WV	X	X			
Bufflehead <i>Bucephala albeola</i>	C-U	WV	X	X			
Oldsquaw <i>Clangula hyemalis</i>	Ca	M	X	X			
White-winged Scoter <i>Melanitta deglandi deglandi</i>	R	Apr	X	X			
*Ruddy Duck <i>Oxyura jamaicensis</i>	C	SR +	X	X			
Hooded Merganser <i>Mergus cucullatus</i>	U	WV	X	X			
Common Merganser <i>Mergus merganser americanus</i>	U	WV	X	X			
Red-breasted Merganser <i>Mergus serrator serrator</i>	C	PR	X	X			
Family Cathartidae Turkey Vulture <i>Cathartes aura teter</i>	U	SR				X	X
Family Accipitridae Sharp-shinned Hawk <i>Accipiter striatus velox</i>	Ca	PR				X	X
Cooper's Hawk <i>Accipiter cooperii</i>	Ca	SR				X	X
Red-tailed Hawk <i>Buteo jamaicensis</i>	U	PR				X	X
Swainson's Hawk <i>Buteo swainsoni</i>	U	PR				X	X
Rough-legged Hawk <i>Buteo lagopus sanctijohannis</i>	U	WV				X	X

Table 2 continued.

Name	Habitats						
	Abundance	Seasonal occurrence	Open water	Marshy land	Beaches	Wet meadow	Dry meadow
Ferruginous Hawk <i>Buteo regalis</i>	U	SR +				X	X
Golden Eagle <i>Aquila chrysaetos</i>	U	PR				X	X
Bald Eagle <i>Haliaeetus leucocephalus</i>	U	WV				X	X
*Marsh Hawk <i>Circus cyaneus hudsonius</i>	C	PR		X		X	X
Family Pandionidae Osprey <i>Pandion haliaetus carolinensis</i>	Ca	M	X	X		X	
Family Faconidae Prairie Falcon <i>Falco mexicanus</i>	Ca	PR		X		X	X
Peregrine Falcon <i>Falco peregrinus</i>	Ca	PR		X		X	X
Merlin <i>Falco columbarius</i>	Ca	PR		X		X	X
American Kestrel <i>Falco sparverius sparverius</i>	C	PR		X		X	X
Family Phasianidae ** *Ring-necked Pheasant <i>Phasianus colchicus</i>	C	PR		X		X	X
**Chukar <i>Alectoris chukar</i>	C	PR		X		X	X
Family Gruidae *Sandhill Crane <i>Grus canadensis</i>	U	M		X		X	X
Family Rallidae *Virginia Rail <i>Rallus limicola limicola</i>	U	PR		X			
*Sora <i>Porzana carolina</i>	U	PR		X			
*?Common Gallinule <i>Gallinula chloropus cackinnaus</i>	Ca	SR		X			
*American Coot <i>Fulica americana americana</i>	A	SR +	X	X	X	X	
Family Charadriidae Semipalmated Plover <i>Charadrius semipalmatus</i>	Ca	M		X	X	X	

Table 2 continued.

Name	Habitats						
	Abundance	Seasonal occurrence	Open water	Marshy land	Beaches	Wet meadow	Dry meadow
*Snowy Plover <i>Charadrius alexandrinus nivosus</i>	U	SR		X	X	X	
*Killdeer <i>Charadrius vociferus vociferus</i>	C	PR		X	X	X	X
Black-bellied Plover <i>Pluvialis squatarola</i>	U	M		X	X	X	
Family Scolopacidae							
*Common Snipe <i>Cappella gallinago delicata</i>	C	PR			X	X	X
*Long-billed Curlew <i>Numenius americanus</i>	U	SR +			X	X	X
*Spotted Sandpiper <i>Tringa macularia</i>	C	SR		X	X	X	
Solitary Sandpiper <i>Tringa solitaria</i>	U	M +		X	X	X	
Greater Yellowlegs <i>Tringa melanoleuca</i>	C	M +		X	X	X	
Lesser Yellowlegs <i>Tringa flavipes</i>	C	M +		X	X	X	
*Willet <i>Catoptrophorus semipalmatus inornatus</i>	C-U	SR		X	X	X	
Red Knot <i>Calidris canutus rufa</i>	R	May		X	X	X	
Baird's Sandpiper <i>Calidris bairdi</i>	Ca	M		X	X	X	
Least Sandpiper <i>Calidris minutilla</i>	U	M +		X	X	X	
Dunlin <i>Calidris alpina pacifica</i>	U	M		X	X	X	
Semipalmated Sandpiper <i>Calidris pusilla</i>	Ca	M		X	X	X	
Western Sandpiper <i>Calidris mauri</i>	U	M		X	X	X	
Sanderling <i>Calidris alba</i>	U	M		X	X	X	
Long-billed Dowitcher <i>Limnodromus scolopaceus</i>	C	M +		X	X	X	
Marbled Godwit <i>Limosa fedoa</i>	C	M +		X	X	X	

Table 2 continued.

Name	Habitats						
	Abundance	Seasonal occurrence	Open water	Marshy land	Beaches	Wet meadow	Dry meadow
Family Recurvirostridae							
*American Avocet <i>Recurvirostra americana</i>	C	SR +	X	X	X	X	
*Black-necked Stilt <i>Himantopus mexicanus mexicanus</i>	C	SR	X	X	X	X	
Family Phalaropodidae							
*Wilson's Phalarope <i>Phalaropus tricolor</i>	C	SR	X	X	X	X	
Northern Phalarope <i>Phalaropus lobatus</i>	C	M	X	X	X	X	
Family Laridae							
Glaucous Gull <i>Larus hyperboreus hyperboreus</i>	R	M	X		X		
Herring Gull <i>Larus argentatus smithsonianus</i>	R	Feb	X				
*California Gull <i>Larus californicus</i>	A	SR +	X	X	X	X	X
Ring-billed Gull <i>Larus delawarensis</i>	A	WV	X	X	X	X	X
Franklin's Gull <i>Larus pipixcan</i>	Ca	SR	X	X	X		
Bonaparte's Gull <i>Larus philadelphia</i>	Ca	M	X	X	X		
Sabine's Gull <i>Xema sabini sabini</i>	Ca	Apr	X	X	X		
*Forster's Tern <i>Sterna forsteri</i>	C	SR	X	X	X		
Common Tern <i>Sterna hirundo</i>	Ca	M	X	X	X		
*Caspian Tern <i>Sterna caspia</i>	U	SR	X	X	X		
*Black Tern <i>Chlidonias niger surinamensis</i>	C	SR	X	X	X		
Family Columbidae							
*Mourning Dove <i>Zenaida macroura marginella</i>	C	SR +					X
Family Stigidae							
Screech Owl <i>Otus asio</i>	Ca	PR				X	X
Great Horned Owl <i>Bubo virginianus</i>	Ca	PR				X	X

Table 2 continued.

Name	Habitats						
	Abundance	Seasonal occurrence	Open water	Marshy land	Beaches	Wet meadow	Dry meadow
Burrowing Owl <i>Athene cunicularia hypugaea</i>	Ca	SR +					X
*Long-eared Owl <i>Asio otus tuftsi</i>	C	PR				X	X
*Short-eared Owl <i>Asio flammeus flammeus</i>	C	PR				X	X
Family Caprimulgidae *Common Nighthawk <i>Chordeiles minor</i>	C	SR		X		X	X
Family Apodidae Black Swift <i>Cypseloides niger borealis</i>	R	May					X
Chimney Swift <i>Chaetura pelagica</i>	R	May					X
Vaux's Swift <i>Chaetura vauxi vauxi</i>	Ca	M					X
White-throated Swift <i>Aeronautes saxatalis</i>	U	M					X
Family Trochilidae Broad-tailed Hummingbird <i>Selasphorus platycercus platycercus</i>	U	SR				X	X
Family Alcedinidae Belted Kingfisher <i>Megaceryle alcyon caurina</i>	Ca	PR	X				
Family Picidae *Common Flicker <i>Colaptes auratus</i>	C	PR				X	X
Lewis' Woodpecker <i>Asyndesmus lewis</i>	Ca	M				X	X
Hairy Woodpecker <i>Dendrocopos villosus</i>	U	PR				X	X
Downy Woodpecker <i>Dendrocopos pubescens leucurus</i>	U	PR				X	X
Family Tyrannidae *Eastern Kingbird <i>Tyrannus tyrannus</i>	C	SR				X	X
Western Kingbird <i>Tyrannus verticalis</i>	C	SR				X	X
*Say's Phoebe <i>Sayornis saya</i>	U	SR				X	X
*Willow Flycatcher <i>Empidonax traillii</i>	C	SR				X	X

Table 2 continued.

Name	Habitats						
	Abundance	Seasonal occurrence	Open water	Marshy land	Beaches	Wet meadow	Dry meadow
Gray Flycatcher <i>Empidonax wrightii</i>	Ca	SR				X	X
Western Wood Pewee <i>Contopus sordidulus</i>	Ca	SR				X	X
Family Alaudidae Horned Lark <i>Eremophila alpestris</i>	Ca	PR					X
Family Hirundinidae Violet-green Swallow <i>Tachycineta thalassina lepida</i>	C	SR	X	X		X	X
Tree Swallow <i>Tachycineta bicolor</i>	C	SR	X	X		X	X
Purple Martin <i>Progne subis</i>	Ca	M				X	X
*Rough-winged Swallow <i>Stelgidopteryx ruficollis</i>	C	SR	X	X		X	X
*Bank Swallow <i>Riparia riparia riparia</i>	C	SR	X	X		X	X
*Barn Swallow <i>Hirundo rustica erythrogaster</i>	C	SR	X	X		X	X
Cliff Swallow <i>Petrochelidon pyrrhonota</i>	C	SR	X	X		X	X
Family Motacillidae Water Pipit <i>Anthus spinoletta</i>	C	WV		X	X	X	
Family Laniidae Loggerhead Shrike <i>Lanius ludovicianus</i>	C	SR +				X	X
Northern Shrike <i>Lanius excubitor invictus</i>	Ca	WV				X	X
Family Cinclidae Dipper <i>Cinclus mexicanus unicolor</i>	Ca	PR	X				
Family Troglodytidae Rock Wren <i>Salpinctes obsoletus obsoletus</i>	R	PR					X
*Long-billed Marsh Wren <i>Cistothorus palustris</i>	C	PR		X			
House Wren <i>Troglodytes aedon parkmanii</i>	Ca	SR				X	X

Table 2 continued.

Name	Habitats						
	Abundance	Seasonal occurrence	Open water	Marshy land	Beaches	Wet meadow	Dry meadow
Family Mimidae							
Mockingbird <i>Mimus polyglottos leucopterus</i>	Ca	SR					X
Sage Thrasher <i>Oreoscoptes montanus</i>	R	SR					X
Family Muscicapidae							
Mountain Bluebird <i>Sialia currucoides</i>	Ca	M				X	X
Townsend's Solitaire <i>Myadestes townsendi townsendi</i>	U	M				X	X
Swainson's Thrush <i>Catharus ustulatus</i>	Ca	M					X
Hermit Thrush <i>Catharus guttatus</i>	Ca	M					X
*American Robin <i>Turdus migratorius propinquus</i>	C	PR				X	X
Blue-gray Gnatcatcher <i>Poliopitila caerulea amoenissima</i>	U	SR				X	X
Family Sylviidae							
Ruby-crowned Kinglet <i>Regulus calendula cineraceus</i>	Ca	PR					X
Family Paridae							
Black-capped Chickadee <i>Parus atricapillus</i>	C	WV				X	X
Family Emberizidae							
Snow bunting <i>Plectrophenax nivalis nivalis</i>	U	WV				X	X
*Song Sparrow <i>Zonotrichia melodia</i>	C	PR		X		X	X
Lincoln's Sparrow <i>Zonotrichia lincolni</i>	Ca	M				X	X
White-crowned Sparrow <i>Zonotrichia leucophrys</i>	C	WV				X	X
Dark-eyed Junco <i>Junco hyemalis</i>	C	WV		X		X	X
Savannah Sparrow <i>Ammodramus sandwichensis</i>	C	SR				X	X
Le Conte's Sparrow <i>Ammodramus leconteii</i>	R	Dec				X	X
Tree Sparrow <i>Spizella arborea ochracea</i>	C	WV				X	X

Table 2 continued.

Name	Habitats						
	Abundance	Seasonal occurrence	Open water	Marshy land	Beaches	Wet meadow	Dry meadow
Chipping Sparrow <i>Spizella passerina arizonae</i>	Ca	M				X	X
Vesper Sparrow <i>Poocetes gramineus</i>	U	SR				X	X
Lark Sparrow <i>Chondrestes grammacus strigatus</i>	Ca	SR				X	X
Sage Sparrow <i>Aimophila belli nevadensis</i>	U	SR				X	X
Green-tailed Towhee <i>Pipilo chlorurus</i>	U	SR				X	X
Rufous-sided Towhee <i>Pipilo erythrophthalmus</i>	Ca	PR				X	X
Black-headed Grosbeak <i>Pheucticus melanocephalus melanocephalus</i>	Ca	SR				X	X
Blue Grosbeak <i>Passerina caerulea interfusa</i>	U	SR				X	X
Lazuli Bunting <i>Passerina amoena</i>	Ca	SR				X	X
Western Tanager <i>Piranga ludoviciana</i>	U	M				X	X
Family Parulidae							
Orange-crowned Warbler <i>Vermivora celata</i>	U	SR				X	X
Nashville Warbler <i>Vermivora ruficapilla ridgwayi</i>	Ca	M				X	X
Virginia's Warbler <i>Vermivora virginiae</i>	Ca	SR				X	X
*Yellow Warbler <i>Dendroica petechia</i>	C	SR				X	X
Black-throated Gray Warbler <i>Dendroica nigrescens nigrescens</i>	Ca	SR				X	X
Townsend's Warbler <i>Dendroica townsendi</i>	U	SR				X	X
Yellow-rumped Warbler <i>Dendroica coronata</i>	C	M				X	X
*Common Yellowthroat <i>Geothlypis trichas</i>	C	SR				X	X
MacGillivray's Warbler <i>Geothlypis tolmiei</i>	Ca	M				X	X

Table 2 continued.

Name	Habitats						
	Abundance	Seasonal occurrence	Open water	Marshy land	Beaches	Wet meadow	Dry meadow
Wilson's Warbler <i>Wilsonia pusilla</i>	Ca	M				X	X
Family Vireonidae							
Solitary Vireo <i>Vireo solitarius</i>	R	May				X	X
Warbling Vireo <i>Vireo gilvus</i>	R	May				X	X
Family Icteridae							
Northern Oriole <i>Icterus galbula</i>	C	SR					X
*Yellow-headed Blackbird <i>Xanthocephalus xanthocephalus</i>	C	SR +		X		X	X
*Red-winged Blackbird <i>Agelaius phoeniceus</i>	C	PR				X	X
*Western Meadowlark <i>Sturnella neglecta</i>	C	PR				X	X
Common Grackle <i>Quiscalus quiscula</i>	R	Mar				X	X
*Brewer's Blackbird <i>Euphagus cyanocephalus</i>	C	PR				X	X
*Brown-headed Cowbird <i>Molothrus ater</i>	C	SR		X		X	X
*Bobolink <i>Dolichonyx oryzivorus</i>	U	SR				X	X
Family Fringillidae							
Pine Siskin <i>Carduelis pinus pinus</i>	C	WV				X	X
*American Goldfinch <i>Carduelis tristis pallida</i>	C	PR				X	X
Cassin's Finch <i>Carpodacus cassinii</i>	Ca	SR				X	X
House Finch <i>Carpodacus mexicanus frontalis</i>	Ca	PR				X	X
Evening Grosbeak <i>Coccothraustes vespertinus brooksi</i>	Ca	M				X	X
Family Ploceidae							
** House Sparrow <i>Passer domesticus domesticus</i>	A	PR				X	X
Family Sturnidae							
** Starling <i>Sturnis vulgaris vulgaris</i>	A	PR				X	X

Table 2 continued.

Name	Habitats						
	Abundance	Seasonal occurrence	Open water	Marshy land	Beaches	Wet meadow	Dry meadow
Family Corvidae							
Pinon Jay <i>Gymnorhinus cyanocephala</i>	Ca	M				X	X
Scrub Jay <i>Apelocoma coerulescens</i>	Ca	M				X	X
*Black-billed Magpie <i>Pica pica hudsonia</i>	A	PR				X	X
Common Crow <i>Corvus brachyrhynchos</i>	A	WV	on ice			X	X
Raven <i>Corvus corax sinuatus</i>	U	PR				X	X

The seasonal occurrence of the birds has been categorized into seven groups: (1) migrants, (2) migrants occasionally remaining in the area, (3) permanent residents, (4) summer residents, (5) summer residents that may occasionally winter, (6) winter visitants, and (7) those having been found only once or twice at the lake. It should be kept in mind that these categories apply to the birds at the lake and do not reflect their status in other parts of the state. For example, the Western Tanager is considered a migrant at the lake but in the state is a summer resident. Migrants are those birds that visit the lake usually twice a year as they pass to and from their breeding grounds. There are 37 species that have been assigned to that status (Table 5). There are 6 species that are migrants, but our records show that occasionally they may remain here during the winter. These are the Solitary Sandpiper, Greater Yellowlegs, Lesser Yellowlegs, Least Sandpiper, Long-billed Dowitcher, and Marbled Godwit. Permanent residents are those found here all the year

around. There are 47 species of this type (Table 6). Summer residents are those that are here during the spring, summer, and fall. Frequently they cannot stand very cold weather or have food habits closely associated with insects or other invertebrates not available during the colder parts of the year. Table 7 lists the 46 summer residents at Utah Lake. Occasionally, some summer residents may winter in the area, although most of their kind have left for more suitable habitats to the south. Twenty-eight species are in this category (Table 8). A few species spend their winter months here and then travel to other areas for breeding purposes. Twenty species are considered to be winter visitants (Table 9). Sixteen species have been recorded once or twice at the lake. They are usually rare visitors in the state as well as to the lake. The species in this group are the Red-necked Grebe, Brown Pelican, Common Egret, Wood Stork, White-fronted Goose, Wood Duck, White-winged Scoter, Red Knot, Herring Gull, Sabine's Gull, Black Swift, Chimney Swift, LeConte's Sparrow, Solitary

TABLE 3. Relative abundance of birds at Utah Lake.

Relative abundance	Species	Percent
Abundant	10	5
Common	76	37
Uncommon	44	22
Casual	55	27
Rare	19	9
Total	204*	

*Several species listed in more than one category.

TABLE 4. Habitat preferences of avian species at Utah Lake.

Habitat	Species
Open water	67
Marsh	101
Beaches	40
Wet meadow	128
Dry meadow	115

Vireo, Warbling Vireo, and Common Grackle. Table 10 summarizes this information.

Sixty-eight species breed at Utah Lake (Table 11). The earliest breeding species commence egg laying in late March and early April and include Double-crested Cormorant, Great Blue Heron, Canada Goose, and House Sparrow. The peak of the nesting season is in the month of May with some late-breeding species extending into July (Fig. 1).

The late nesters are Snowy Plover, Killdeer, Spotted Sandpiper, Mourning Dove, Willow Flycatcher, Yellow Warbler, Brown-headed Cowbird, Bobolink, and American Goldfinch.

There are four species of birds that are not native to the area and are now part of the permanent resident population. They are the Ring-necked Pheasant, Chukar, House Sparrow, and Starling.

Rock Island

A unique feature of Utah Lake is Rock Island. It formerly provided a nesting and resting habitat for a number of birds, but the rising level of the water in the lake during the 1970s completely inundated the island. The yearly fluctuations of the lake now result in the island being visible during part of the year and then disappearing as the water rises. It is not known how long the island has existed. Bee (1924-1962) mentioned the killing of pelicans on the island in 1890. Goodwin (1904:128) indicated that there were about

200 young pelicans on the island in 1904, and added that they ranged in size "from a half grown gosling, to that of a large fowl and larger." Nothing was recorded about the island for the 25-year interval between Goodwin's report and Cottam's (1929c) list of the water birds of Utah Lake. Cottam (1935) reported great numbers of California Gulls nesting on the island and that the colony had been on the increase for a number of years. Bee (1924-1962) and Hayward (1936-present) report a number of visits to the island in the 1930s. Hayward (1935a) discussed the Caspian Tern colony on the island and reported that from 1927 to 1933 the tern colony diminished in size as the California Gull colony increased. Beck (1942b) gave the best physical description of the island and also included an aerial photograph [p. 105]. He in-

TABLE 5. Migrant species at Utah Lake. For scientific names see Table 1.

1. Common Loon
2. Horned Grebe
3. Snow Goose
4. Greater Scaup
5. Lesser Scaup
6. Oldsquaw
7. Osprey
8. Sandhill Crane
9. Semipalmated Plover
10. Black-bellied Plover
11. Baird's Sandpiper
12. Dunlin
13. Semipalmated Sandpiper
14. Western Sandpiper
15. Sanderling
16. Northern Phalarope
17. Glaucous Gull
18. Bonaparte's Gull
19. Common Tern
20. Vaux's Swift
21. White-throated Swift
22. Lewis's Woodpecker
23. Purple Martin
24. Mountain Bluebird
25. Townsend's Solitaire
26. Swainson's Thrush
27. Hermit Thrush
28. Lincoln's Sparrow
29. Chipping Sparrow
30. Western Tanager
31. Nashville Warbler
32. Yellow-rumped Warbler
33. MacGillivray's Warbler
34. Wilson's Warbler
35. Evening Grosbeak
36. Pinon Jay
37. Scrub Jay

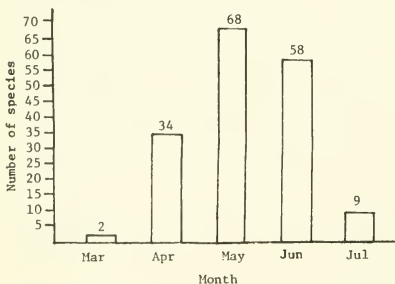


Fig. 10. Breeding chronology of birds at Utah Lake. Species counted in each month that they were found breeding.

dicated that there were four main plant communities on the island. Beck estimated that in a three-year period (1940–1942) the California Gull population increased from 22,730 to 68,744. He considered this colony to be one of the largest California Gull colonies in the world. Behle (1945) visited Rock Island 26 May 1932 and reported 12 species of birds on the island at that time. Sugden (1947) reported nesting California Gulls on the island in May of 1945 and 1946. In six nests, he found

an exotic egg in the gull's nest. Each of five nests had a pheasant egg besides the gull eggs, and one nest was found with a coot egg. In November 1951 a flock of 25 Snow Buntings were seen at Rock Island by Floyd Thompson. One was found dead and was presumed to have been shot the previous day by a duck hunter (Lockerbie and Behle 1952). In 1957 Bee (1924–1962) reported 6 species of birds on the island in June and noted that the California Gulls had completed their nesting.

TABLE 6. Permanent residents at Utah Lake. For scientific name see Table 1.

1. Pied-bill Grebe
2. Mallard
3. Gadwall
4. Pintail
5. Green-winged Teal
6. Blue-winged Teal
7. Red-breasted Merganser
8. Sharp-shinned Hawk
9. Red-tailed Hawk
10. Swainson's Hawk
11. Golden Eagle
12. Marsh Hawk
13. Prairie Falcon
14. Peregrine Falcon
15. Merlin
16. American Kestrel
17. Ring-necked Pheasant
18. Chukar
19. Virginia Rail
20. Sora
21. Killdeer
22. Common Snipe
23. Screech Owl
24. Great Horned Owl
25. Long-eared Owl
26. Short-eared Owl
27. Belted Kingfisher
28. Common Flicker
29. Hairy Woodpecker
30. Downy Woodpecker
31. Horned Lark
32. Dipper
33. Rock Wren
34. Long-billed Marsh Wren
35. American Robin
36. Ruby-crowned Kinglet
37. Song Sparrow
38. Rufous-sided Towhee
39. Red-winged Blackbird
40. Western Meadowlark
41. Brewer's Blackbird
42. American Goldfinch
43. Cassin's Finch
44. House Sparrow
45. Starling
46. Black-billed Magpie
47. Raven

TABLE 7. Summer residents at Utah Lake. For scientific name see Table 1.

1. White Pelican
2. Cattle Egret
3. Snowy Egret
4. Turkey Vulture
5. Cooper's Hawk
6. Common Gallinule
7. Snowy Plover
8. Spotted Sandpiper
9. Black-necked Stilt
10. Forster's Tern
11. Caspian Tern
12. Black Tern
13. Common Nighthawk
14. Broad-tailed Hummingbird
15. Eastern Kingbird
16. Western Kingbird
17. Say's Phoebe
18. Willow Flycatcher
19. Gray Flycatcher
20. Western Wood Pewee
21. Violet-green Swallow
22. Tree Swallow
23. Rough-winged Swallow
24. Bank Swallow
25. Barn Swallow
26. Cliff Swallow
27. House Wren
28. Mockingbird
29. Sage Thrasher
30. Savannah Sparrow
31. Vesper Sparrow
32. Lark Sparrow
33. Sage Sparrow
34. Green-tailed Towhee
35. Black-headed Grosbeak
36. Blue Grosbeak
37. Lazuli Bunting
38. Virginia's Warbler
39. Yellow Warbler
40. Black-throated Gray Warbler
41. Townsend's Warbler
42. Common Yellowthroat
43. Northern Oriole
44. Brown-headed Cowbird
45. Bobolink
46. Cassin's Finch

He mentioned the presence of Forster's Terns and Black Terns, but no Caspian Terns. It has been only in the last three or four years that the island has been completely inundated. As the lake recedes, in years to come it may once more become an area that birds may use. The increased use of the lake as a recreational area with larger numbers of motor boats may result in the area being less useful to wildlife than it has been in the past. The foregoing reports indicate that 18 species of birds have been observed on the island. The breeding and nonbreeding species are listed in Table 12.

During the years 1940-1944, Vasco M. Tanner and other members of the Department of Zoology at Brigham Young University banded young California Gulls on Rock Island. Regular aluminum U.S. Fish and Wildlife bands were used plus red- and yellow-colored bands in various combinations to distinguish the years the birds were banded. A total of 2316 birds were banded, and of this number 128 were reported as being seen, captured, or found dead, a 5.5 percent recov-

ery of the banded birds (Tanner 1941, 1947, Tanner and Beck 1942). Table 13 summarizes the banding data for the four-year period.

The Future of Utah Lake

Human impact will continue to be a factor affecting the avifauna of the lake. The degree of impact can be great or small depending upon the manner in which Utah Lake will be managed in the future. The lake will remain a multipurpose unit involved in furnishing water to Salt Lake Valley, providing a recreational area, supporting populations of wildlife, and being an object of beauty and inspiration to those who appreciate the wonders of nature. At the present time no one agency or organization is actively involved in looking at the lake as a whole and considering its many uses. The lake water users have their objectives and aims in mind

TABLE 9. Winter visitants at Utah Lake. For scientific names see Table 1.

1. Whistling Swan
2. Black Duck
3. Ring-necked Duck
4. Common Goldeneye
5. Barrow's Goldeneye
6. Bufflehead
7. Hooded Merganser
8. Common Merganser
9. Rough-legged Hawk
10. Bald Eagle
11. Ring-billed Gull
12. Water Pipit
13. Northern Shrike
14. Black-capped Chickadee
15. Snow-Bunting
16. White-crowned Sparrow
17. Dark-eyed Junco
18. Tree Sparrow
19. Pine Siskin
20. Common Crow

TABLE 8. Summer residents that may occasionally winter at Utah Lake. For scientific names see Table 1.

1. Eared Grebe
2. Western Grebe
3. Double-crested Cormorant
4. Great Blue Heron
5. Black-crowned Night Heron
6. American Bittern
7. White-faced Ibis
8. Canada Goose
9. Cinnamon Teal
10. American Wigeon
11. Northern Shoveler
12. Redhead
13. Canvasback
14. Ruddy Duck
15. Ferruginous Hawk
16. American Coot
17. Long-billed Curlew
18. Willet
19. American Avocet
20. Wilson's Phalarope
21. California Gull
22. Franklin's Gull
23. Mourning Dove
24. Burrowing Owl
25. Loggerhead Shrike
26. Blue-gray Gnatcatcher
27. Orange-crowned Warbler
28. Yellow-headed Blackbird

TABLE 10. Seasonal occurrence of birds at Utah Lake.

Status	Number	Percent
Migrants	37	19
Migrants that occasionally winter	6	3
Permanent residents	47	24
Summer residents	46	23
Summer residents that occasionally winter	28	14
Winter visitants	20	10
Occasional visitants	16	8
	200	

TABLE 11. Nesting species at Utah Lake. For scientific names see Table 2.

	Nests during				
	Mar	Apr	May	Jun	Jul
1. Eared Grebe			-----	-----	-----
2. Western Grebe			-----	-----	-----
3. Pied-billed Grebe			-----	-----	-----
4. White Pelican				-----	-----
5. Double-crested Cormorant	-----	-----	-----		
6. Great Blue Heron		-----	-----		
7. Cattle Egret			-----		
8. Snowy Egret		-----	-----	-----	
9. Black-crowned Night Heron		-----	-----		
10. American Bittern			-----	-----	
11. White-faced Ibis			-----	-----	-----
12. Canada Goose	-----	-----	-----		
13. Mallard	-----	-----	-----		
14. Gadwall			-----	-----	-----
15. Pintail			-----	-----	
16. Green-winged Teal			-----	-----	
17. Blue-winged Teal			-----	-----	
18. Cinnamon Teal			-----	-----	
19. Northern Shoveler			-----	-----	
20. Redhead	-----	-----	-----		
21. Ruddy Duck			-----	-----	
22. Marsh Hawk		-----	-----	-----	-----
23. Ring-necked Pheasant			-----	-----	
24. Sandhill Crane			-----		
25. Virginia Rail		-----	-----	-----	
26. Sora			-----	-----	
27. Common Gallinule			-----	-----	
28. American Coot		-----	-----	-----	
29. Snowy Plover		-----	-----	-----	-----
30. Killdeer		-----	-----	-----	-----
31. Common Snipe	-----	-----	-----	-----	
32. Long-billed Curlew		-----	-----	-----	
33. Spotted Sandpiper			-----	-----	-----
34. Willet			-----	-----	
35. American Avocet	-----	-----	-----	-----	
36. Black-necked Stilt			-----	-----	-----
37. Wilson's Phalarope			-----	-----	
38. California Gull	-----	-----	-----	-----	
39. Forster's Tern		-----	-----	-----	
40. Caspian Tern		-----	-----	-----	
41. Black Tern			-----	-----	
42. Mourning Dove			-----	-----	-----
43. Long-eared Owl	-----	-----	-----		
44. Short-eared Owl	-----	-----	-----		
45. Common Night Hawk			-----	-----	
46. Common Flicker		-----	-----	-----	
47. Eastern Kingbird			-----	-----	
48. Say's Phoebe	-----	-----	-----	-----	
49. Willow Flycatcher			-----	-----	-----
50. Rough-winged Swallow			-----	-----	
51. Bank Swallow			-----	-----	
52. Barn Swallow	-----	-----	-----	-----	
53. Long-billed Marsh Wren	-----	-----	-----	-----	
54. American Robin	-----	-----	-----	-----	
55. Song Sparrow	-----	-----	-----	-----	
56. Yellow Warbler			-----	-----	-----
57. Common Yellowthroat	-----	-----	-----	-----	

Table 11 continued.

	Nests during				
	Mar	Apr	May	Jun	Jul
58. Yellow-headed Blackbird			-----		
59. Red-winged Blackbird			-----		
60. Western Meadowlark			-----		
61. Brewer's Blackbird			-----		
62. Brown-headed Cowbird			-----		
63. Bobolink			-----		
64. American Goldfinch			-----		
65. House Sparrow		-----			
66. Starling		-----			
67. Black-billed Magpie		-----			
68. Common Crow		-----			

TABLE 12. Birds of Rock Island, Utah Lake, Utah. For scientific names see Table 1.

Breeding species	Nonbreeding species
1. White Pelican	1. Double-crested Cormorant
2. Canada Goose	2. Snowy Plover
3. Mallard	3. Willet
4. Pintail	4. Sanderling
5. Killdeer	5. American Avocet
6. Spotted Sandpiper	6. Snow Bunting
7. California Gull	7. Yellow Warbler
8. Forster's Tern	
9. Caspian Tern	
10. Black Tern	
11. Song Sparrow	

TABLE 13. Banding results of California Gulls at Rock Island, Utah Lake, Utah, 1940-1944.

Year	No. banded	British Columbia	WA	OR	CA	Baja California	Mexico	NV	ID	UT	WY	Total recoveries
1940	1,000			2	10		1	1	1	28	1	44
1941	1,000	1	5	4	12	1	2			57		82
1942	300			1						1		2
1944	16											
Total	2,316	1	5	7	22	1	3	1	1	86	1	128

as do the municipalities that border the lake and the Division of Wildlife Resources, who by state law are responsible for the wildlife in, on, and around the lake. Shall each agency continue to follow its course of action without consulting or being aware of the objectives of other involved parties? To do so would cause, in time, utter chaos as the demands of each agency upon the lake become greater. Careful consideration needs to be given now to the multifaceted nature of Utah Lake. Some of the problems concerned with

the management of the lake are briefly mentioned.

Conservative projections of population growth in Utah and Salt Lake Valleys indicate that many more thousands of people will be living here by the year 2000. More people will necessitate the continued upgrading of wastewater plants in the various communities so that water quality will be maintained in the lake. Increased population will mean increased use of the lake for irrigation, industry, culinary purposes, fishing,



Fig. 9. Marsh Hawk. Photo by R. J. Erwin.

boating, waterskiing, picnicking, and hunting. Some of these recreational needs are being provided by the Utah Lake State Park at the mouth of Provo River and the marinas being developed by the cities of American Fork and Orem.

Provo City has been contemplating an increase in the number and length of runways at the Provo Airport to accommodate larger aircraft. One proposal is to increase the runways southward into the Provo Bay area. The Bureau of Reclamation has as part of the Central Utah Project the diking and draining of Provo and Goshen Bays to reclaim land and reduce evaporation from the lake. As the population of Salt Lake Valley increases, their demands for water for irrigation, industry, and culinary use will become greater. The Division of Wildlife Resources is concerned with how the greater use of the lake will affect its wildlife.

These problems and many others need to be considered. Can all the demands put upon the lake be satisfied? Should the airport runways be extended into the nesting habitat of ducks, geese, and colonial water birds? Is more land and water more important than breeding habitat for wildlife? Can Salt Lake

Valley drain from the lake level without considering the needs for recreation and other interests in Utah Valley? Should the Division of Wildlife Resources develop wildlife management areas to protect and provide more breeding and resting habitat? Should private organizations such as the Audubon Society or other groups be encouraged to develop wildlife sanctuaries? Should more marinas be constructed for increased boating and associated activities?

Is there a way that all the groups interested in Utah Lake can function together so that a unified plan may be formulated—not an agency that would dictate what should be done, but one that would bring interested groups together so that an interplay of ideas, objectives, and plans could be discussed and problems resolved? Fortunately, there is such an agency available. In 1973 the Utah State Legislature enacted the Provo-Jordan River Parkway Authority (State Lands 1973). This legislation became part of the Utah Code Annotated Section 65-10-1 and is as follows:

There is created within the department of natural resources a division to be known as the Provo-Jordan River parkway authority and the board of the Provo-Jordan River parkway authority for the purpose of establishing and coordinating programs for the development of rec-

reational areas, water conservation, flood control, reclamation, and wildlife resources on or along the Provo and Jordan Rivers and their tributaries.

Does Utah Lake fit into this legislation? Considerable discussion has been carried on concerning this question, and the answer is that Utah Lake is an integral part of the Provo-Jordan River parkway plan.

The problems that confront us at the present time need to be discussed and resolved for the sake of Utah Lake. The sooner the interested parties can be brought together and made aware of all the problems, the sooner they may be solved. Utah Lake is too valuable an asset to be allowed to deteriorate or be exploited by one group over another. Only cooperation and consideration by all parties can solve the problems that confront us at this time.

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